Course Handout (2019-20 ODD SEMESTER)

Subject Name/Code: OPERATING SYSTEMS(MC4109) Branch/Sem/Batch : MCA( 1st Semester)

Name of Faculty : Dr. Debasmita Pradhan, Dr. Bishnu Priya Panda

# Scope & Objective -:

1. To acquaint the students with basics of operating system. 2. To familiarize with different techniques or algorithms used to design the operating system. 3. To provide a platform to become a system designer. 4. To become an efficient application developer with proper knowledge of operating system

# Pre-Requisite -:

Fundamental of computer system, C programming, Data Structure

# Outcome -:

1. Explore principles behind various types of operating systems, system components, system calls, protection mechanisms and services. 2. Acquire the knowledge of different schedulers, scheduling policies, and design new scheduling algorithms for real life problems. 3. Analyse and understand the significance of process synchronization through classical synchronization problems. Get acquaintance with deadlock handling mechanism. 4. Describe the working principle of main memory, cache memory and virtual memory organization and solve memory related problems. 5. Acquire the basic knowledge of secondary storage management, and analyze the performance of various disk scheduling algorithm. 6. Identify issues in file structures of various operating systems and get familiar with protection and security mechanisms.

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| **#** | **Topic** | **Chapter** | **Course Coverage** | **No of Classes** |
| 1 | Introduction to OS, Booting Process | ch 1 | TRUE | 1 |
| 2 | Types of OS: Different views of OS , Computer system architecture | ch 1 | TRUE | 1 |
| 3 | Operating system structure, OS operations. Kernel Data structure, Computing Environments | ch 1 | TRUE | 1 |
| 4 | Operating System Services | ch 2 | TRUE | 1 |
| 5 | System calls and its types | ch 2 | TRUE | 1 |
| 7 | Process Management: Process Concept, Process States, PCB | ch 3 | TRUE | 1 |
| 8 | Process Scheduling, Schedulers | Ch3 | TRUE | 1 |
| 9 | Context Switching, Operations on Processes, Cooperating Process | Ch3 | TRUE | 1 |
| 10 | Multithreaded Programming , Multithreading Models, Linux Threads | Ch4 | TRUE | 1 |
| 11 | Process Scheduling :Basic concepts, CPU-I/O Burst Cycle ,CPU Scheduler, Preemptive Scheduling CPU scheduling criteria | ch 5 | TRUE | 1 |
| 12 | FCFS , RR Scheduling Algorithm | ch 5 | TRUE | 1 |
| 13 | SJF and Priority, Multilevel and Multilevel feedback queue Scheduling algorithm | ch 5 | TRUE | 2 |
| 14 | Process synchronization, Critical section problem, Peterson Solution | ch 6 | TRUE | 1 |
| 15 | Synchronization Tools: Synchronization Hardware, , Mutex Locks ,Semaphore, deadlocks and starvation | ch 6 | TRUE | 1 |
| 16 | Classical Problems of Synchronization  The Bounded-Buffer Problem | ch 6 | TRUE | 1 |

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| 17 | Classical Problems of Synchronization  The readers-Writers Problem, The Dining-Philosopher Problem | ch 6 | TRUE | 1 |
| 18 | Monitor: Implementation of monitor | ch 6 | TRUE | 1 |
| 19 | Dining-Philosophers Solution Using Monitor | ch 6 | TRUE | 1 |
| 20 | Implementing a Monitor using Semaphores | ch 6 | TRUE | 1 |
| 21 | Deadlock: Deadlock Characterization, Resource allocation Graph | ch 7 | TRUE | 1 |
| 22 | Deadlock Prevention | ch 7 | TRUE | 1 |
| 23 | Deadlock Avoidance, Banker's Algorithm | ch 7 | TRUE | 1 |
| 24 | Deadlock Detection | ch 7 | TRUE | 1 |
| 25 | Deadlock Recovery | ch 7 | TRUE | 1 |
| 26 | Memory Management:Address Binding, Logical versus Physical Address space | ch 8 | TRUE | 1 |
| 27 | Swapping, contiguous Allocation | ch 8 | TRUE | 1 |
| 28 | Memory Allocation , Fragmentation , Segmentation | ch 8 | TRUE | 1 |
| 29 | Paging, | ch 8 | TRUE | 1 |
| 30 | Structure of page table: Hierarchical, hash , inverted. | ch 8 | TRUE | 1 |
| 31 | Virtual Memory: Background, Demand paging, performance of Demand paging | ch 9 | TRUE | 1 |
| 32 | Page Replacement, Page Replacement Algorithms | ch 9 | TRUE | 1 |
| 33 | Page Replacement, Page Replacement Algorithms | ch 9 | TRUE | 1 |
| 34 | Allocation of frames, Thrashing | ch 9 | TRUE | 1 |
| 35 | File Concept, File Attributes, File Operations, File Types, File Structures | Ch10 | True | 1 |
| 36 | File System Mounting, Protection | Ch10 | True | 1 |
| 37 | Directory and Disk Structure | Ch10 | True | 1 |
| 38 | Overview of Mass Storage Structure | ch 12 | TRUE | 1 |
| 39 | Disk Structure, Disk Scheduling, | ch 12 | TRUE | 1 |
| 40 | Disk Structure, Disk Scheduling, | ch 12 | TRUE | 1 |
| 41 | I/O System Overview, I/O Hardware, | ch 13 | TRUE | 1 |

# Total no. of classes : 42

Text Book

Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, 9th edition, Wiley-India, 2009

# Reference Book

Operating Systems, William Stallings, PHI Learning Pvt. Ltd.

Mordern Operating Systems, Andrew S. Tanenbaum, 3 rd Edition, PHI